KARIN IMMERGUT, OSB #96314
United States Attorney
STEVE ODELL, OSB #90353
Assistant United States Attorney
District of Oregon
600 United States Courthouse
1000 SW. Third Avenue
Portland, OR 97204-2902
(503) 727-1000

ROBERT L. GULLEY, Senior Trial Attorney
RUTH ANN LOWERY, Trial Attorney
COBY HOWELL, Trial Attorney
U.S. Department of Justice
Wildlife & Marine Resources Section
Benjamin Franklin Station, P.O. Box 7369
Washington, DC 20044-7369
(202) 305-0217 (ph)
(202) 305-0275 ((fax)

Attorneys for Defendant

UNITED STATES DISTRICT COURT
DISTRICT OF OREGON

NATIONAL WILDLIFE FED'N, et al., Plaintiffs, v. NATIONAL MARINE FISHERIES SERVICE and UNITED STATES ARMY CORPS OF ENGINEERS, Defendants.	Civ No. 01-00640-RE Second Declaration of Roger P. Schiewe (Preliminary Injunction)

I, Roger Schiewe, declare as follows:

1. I am an Engineer, and the Fishery Impact Technical Expert and Principal Hydro Power System Operations Engineer, for the Bonneville Power Administration (BPA). I received a Bachelor of Science degree in Mathematics from the University of Oregon in June 1970 and subsequently furthered my education at Portland State University through engineering courses.

2. My job responsibilities include analyzing the Federal Columbia River Power System (FCRPS) impacts from operations for fish and other non-power purposes. I have worked continuously for BPA in different aspects of this FCRPS operation and planning function since July 1970.

3. BPA uses the results from computer models designed to simulate the physical characteristics and operations of the hydroelectric system dams and reservoirs in the Columbia River Basin in making decisions in many areas. Some examples of the types of decisions which rely on such modeling are: Endangered Species Act consultations with National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS); BPA rate-making processes; Columbia River Treaty and Pacific Northwest Coordination Agreement planning activities; and short- and long-term power marketing decisions. For example, I am currently participating in system modeling required to develop BPA rates for the next rate period (FY 2007 – 2009).

Plaintiffs' Proposed Operations for 2006

4. In the case before the court, plaintiffs filed a motion on October 31, 2005, for an injunction ordering particular operations of and objectives at Federal hydroelectric projects in the Columbia and Snake Rivers. I coordinated BPA's computer analyses (Study) of the effects of the operations sought by the Plaintiffs in their motion. The objective of the Study was to evaluate the reliability of the Columbia River Inter-Tribal Fish Commission's (CRITFC) modeling for the Plaintiffs' (as described in the Heinith Declaration), identify the potential costs to ratepayers of implementing Plaintiffs' proposal, and to identify other power-related concerns that would be expected to occur if

the injunction were granted as compared with the operations conducted under the 2004 Updated Proposed Action (UPA) reviewed in the 2004 Biological Opinion (2004 BiOp).

5. Specifically, the Plaintiffs asked the federal Defendants to do the following "to reduce the harm to salmon and steelhead listed under the Endangered Species Act" (Pls' Mtn. for Further Injunctive Relief at page 1):

6. (A) Provide additional voluntary spill at lower Snake and lower Columbia projects in the spring and summer to "allow more fish to pass these dams with better survival and migrate more safely in the river." See Pls' Memo in Support of Mtn. at page 4. Plaintiffs provided a list of spill criteria for specific projects to accomplish this end and stated their requests should be limited to the "extent necessary to keep dissolved gas levels below the gas caps." Id. at page 5-6; and

7. (B) Provide changes in project operations to "produce a more natural river hydrograph with peak flows in the late spring and early summer." Pls' Memo in Support of Mtn. at page 4. Plaintiffs provided a list of measures they assert will accomplish this objective, including operating reservoirs in the U.S. and Canada to the highest level allowed for flood control purposes (i.e., at "upper rule curve"), providing additional releases of water from storage reservoirs in the summer, and lowering water levels in the pools behind many of the lower Snake and lower Columbia projects during the juvenile migration season. Pls' Mtn at page 2.

8. In order to evaluate the effects of the requests, BPA used a computer model of the hydro-system (HYDSIM) to show how reservoirs and projects would operate in 2006 under: 1) the 2004 UPA/BiOp operations; and, alternatively 2) the Plaintiffs' proposed operations.

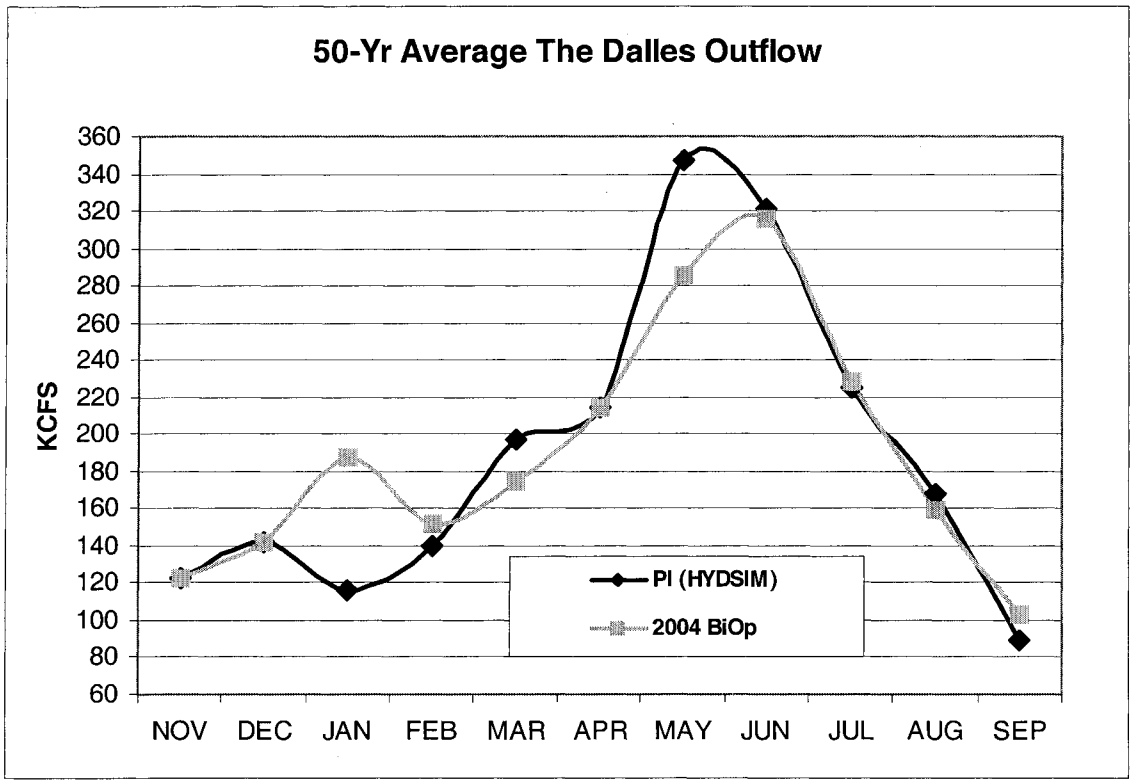
9. We ran the HYDSIM model on the operations proposed by Plaintiffs without regard to their feasibility. In particular, even though we believe the Plaintiffs' proposal to operate Treaty reservoirs to their upper flood control rule curves in 2006 is infeasible for many reasons (See Declaration of Rick Pendergrass.), we determined that for our modeling we would attempt to faithfully apply the Plaintiffs' proposal, as presented in their motion, to allow an accurate comparison of our results to Plaintiffs' results.

10. The HYDSIM model is very similar to the GENESYS model the Plaintiffs relied on to develop their proposed operation. Both models require the same input parameters and formats. Given all the same input assumptions the models produce nearly identical results. BPA and staff of the Power Planning and Conservation Council, who also use the SYSGEN model used by CRITFC for the Plaintiffs, have confirmed this over the past several years. The HYDSIM model used inflows throughout the Columbia River Basin from 50 water conditions (those that occurred from 1929-1978) as input to simulate how the hydro-system would operate under a wide range of conditions while meeting the requirements established in the UPA/BiOp and, in comparison, while meeting the requirements in the Plaintiffs' proposal. Model results can be displayed individually for each of the 50 water conditions modeled or as an average of the 50 water conditions. The 50-year average serves as a surrogate for operations in a "normal" water year

11. The Plaintiffs displayed a limited amount of the information produced in their modeling of their proposal in the supporting declaration from Heinith. For example, they displayed the 50-year average outflows at The Dalles for each month, produced by their GENESYS model (see Heinith Dec. at page 12, Figure 3), to illustrate their

contention that their objective of a more natural hydrograph resulting in a May average flow of 345,000 cubic feet per second can be accomplished. Through legal counsel, we were able to obtain from Plaintiffs some of the key information underlying the modeling Mr. Heinith relied upon.

12. As I have indicated, we modeled Plaintiffs' proposal using HYDSIM. We found that BPA's HYDSIM modeling of the Plaintiffs' proposal resulted in very similar flows to the GENESYS results reported by Heinith (although, for the reasons discussed below and in other federal declarations, this does not mean the operations can actually be implemented). The following graph displays the HYDSIM modeling flow results for both Plaintiffs' proposed operations (darker line) and operations under the 2004 BiOp (lighter line):



13. As the graph illustrates, generally speaking, the Plaintiffs' proposal moves flows from the January-through-February period into the March-through-May period, relative to the UPA/BiOp operation. The Plaintiffs state (Heinith at page 8) an expectation of increased flow volume for salmon of about 4 million acre-feet from their proposal based on their GENESYS model results.

14. BPA's HYDSIM modeling showed a similar flow volume change relative to the UPA/BiOp in the April through August period resulting from Plaintiffs' proposal. However, a number of significant caveats must be taken into account in approaching these results, as I discuss next.

15. **Plaintiffs Rely Heavily on Infeasible Changes to Canadian Operations.** The vast majority of the increased volume of water for flow that Plaintiffs' rely upon (3.8 MAF) is the result of Plaintiffs' request to change the operation of reservoirs in another country, Canada, where the Action Agencies have no authority to direct operations.

16. **Plaintiffs' Assertions Depend on the Speculative Assumption That 2006 Will Be An "Average" Water Year.** Our modeling shows (though the Plaintiffs did not mention) that their proposal fails to meet their objective of a peak average May flow of 345,000 cubic feet per second in *half* of the 50 water conditions. Indeed, a critical predicate for their proposal is that they assumed 2006 would be an "average" water year, as represented by the 50-year average condition. See Heinith Dec. at 12, Figure 3, (note indicating that the flow regime is "based upon the average of 50 years of historical flows"). This is a fundamental (but unsupported) assumption. Only by making that assumption can Plaintiffs draw the conclusion that their flow objectives could be

met. If 2006 is a below average water year, our HYDSIM modeling of the Plaintiffs' proposal shows the objective cannot be accomplished. Indeed, even some of the 50 water conditions used in modeling that are *average* showed that the objective could not be reached. It may turn out that 2006 is an average water condition, but at this time that is only speculation. The value of using the HYDSIM model is that it allows us to consider how we would operate the hydro system in a wide range of water conditions that could occur in 2006, through the use of 50 historical water conditions. I have reviewed CRITFC's results (they used the same 50 historical water conditions we used) and they show similar shortfalls in meeting the flow objective at The Dalles using GENESYS.

17. **Plaintiffs' Proposal Would Negatively Impact Providing Flows For Other Species.** Plaintiffs also fail to discuss whatsoever the impacts of their proposal on the other flow-related goals that also need to be addressed by the Action Agencies in their operation of the hydro-system. For example, the operation of the federal reservoirs from November into April is intended to accommodate the needs of other salmon that spawn in the mainstem of the Columbia River, not just those the Plaintiffs focus upon. These include chum salmon and Hanford Reach fall Chinook.

18. (A) Chum salmon - An ESA-listed species, Chum salmon spawn below Bonneville Dam in the fall, and operational decisions through the winter must weigh the value of keeping their redds covered with water through the following spring, by releasing water from reservoirs, versus the potential negative effect (dewatering the redds) of reducing outflows during the fall and winter period in order to make more water available to augment flows for spring migrants. The decisions made are strongly influenced by the water condition expected during the spring of each year.

19. HYDSIM modeling showed that, under the UPA/BiOp operation, Chum redds are covered continuously from December through April in 31 of the 50 water conditions (i.e., under *most* of the historical water conditions). Under the Plaintiffs' proposal, however, because water is held in reservoirs to stay as near the upper flood control rule curve as possible, Chum redds are continuously covered in only 19 of 50 water conditions (i.e., in *less than half* of historically observed water conditions). The Plaintiffs only mention this species in passing (Heinith Dec. at page 6, footnote 10) and state that: "Preliminary modeling by the Fish Passage Center indicates that the chum habitat criteria can be maintained while maintaining storage reservoirs at their upper flood control rule curve elevations." The Fish Passage Center modeling has not been shared, but the conclusion Mr. Heinith ascribes to the Center is highly questionable, in light of BPA's HYDSIM and CRITFC's GENESYS results. The GENESYS results show that flows below Bonneville drop below fall spawning level flows in the December-April period in 22 out of the 50 years they modeled, thus conclusively refuting Mr. Heinith's contention.[1]

20. (B) Hanford Reach Fall Chinook - Similarly, the Action Agencies have committed to maintaining a minimum flow level through the winter months to keep Hanford Reach fall Chinook (unlisted) redds, established in the Hanford Reach (the reach of the Columbia River between Priest Rapids and McNary Dams) in November, continuously covered through May. There is a significant level of regional interest in

[1] I am aware of a November 17, 2005 Northwest Power and Conservation Council (Council) memorandum that provides a preliminary analysis of Plaintiffs' proposed operations. This memorandum implies that Plaintiffs' proposed operation would be better for Chum through its conclusion that dewatering of Chum salmon redds would occur less frequently with the Plaintiffs' proposed operation than under the Biological Opinion. It is my opinion that the Council analysis does not fulfill Plaintiffs' request because my understanding is that Council's analysis allows draft of reservoirs to meet load, and thus allows deviation from meeting upper rule curves for the full period requested by Plaintiffs. I believe BPA's analysis of potential impacts to Chum is more accurate because it attempts to fully implement Plaintiffs' proposed operation, which requires operating to upper rule curves.

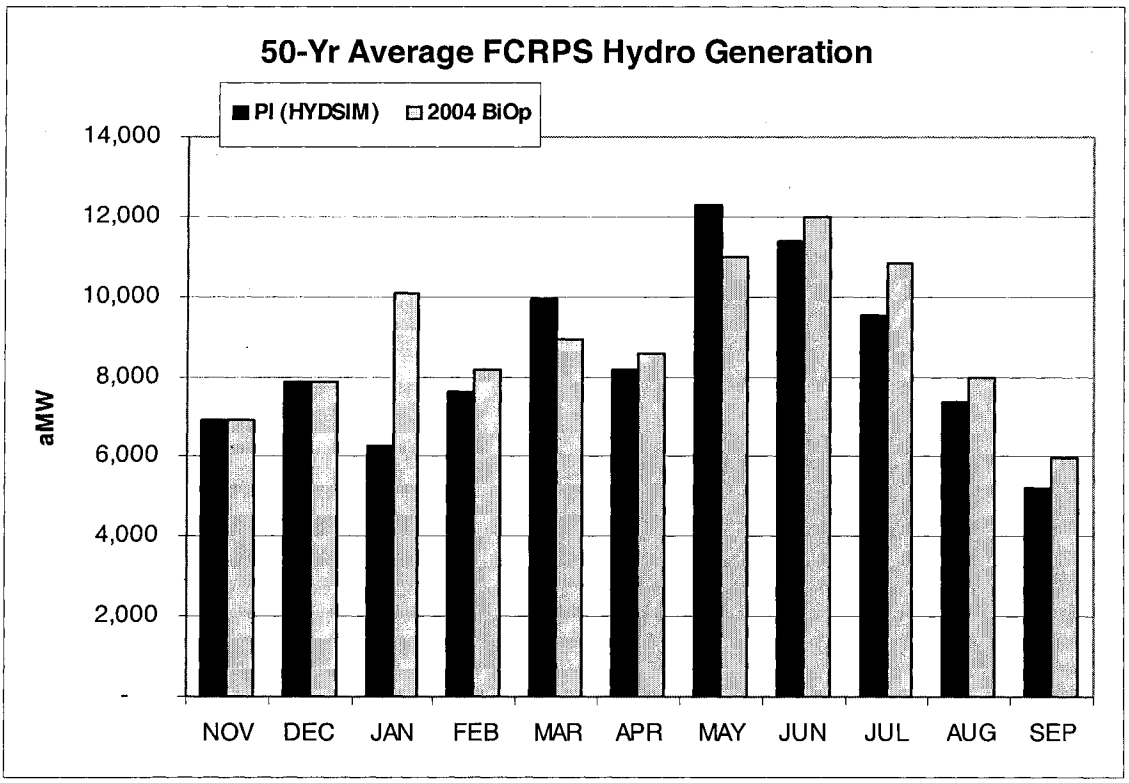
seeing that this population, the only population of Chinook to spawn in this free-flowing reach of the Columbia, continues to do well. BPA signed an agreement in April 2004 to provide continuous flows to protect the fragile redds. Withholding flows while keeping reservoirs at upper rule curves keeps these redds covered continuously in only 19 of 50 water conditions (less than half the years modeled), according to both the GENESYS and HYDSIM model results, which is obviously not consistent with the region's goals for this population. By contrast the UPA/BiOp operation achieves the goal in 49 of the 50 water conditions (*nearly all*), providing a high level of reliable protection for these fish. Plaintiffs apparently have not considered the effect of shutting off flows on these salmon during this critical development period and thereby causing negative impacts to the one population of salmon generally recognized as the healthiest and most stable in the Columbia River Basin.

21. **Plaintiffs' Proposal Would Cause Significant Impacts to Power Production and Power Revenues.** The Plaintiffs made extremely brief mention of the impact of their proposal to power production for the region. Their assessment is that their proposal "...would limit power production to some extent (but would not interfere with the stability or the reliability of the power production system)..." (Pls' Memo. in Support of Mtn. At pages 11-12). They offer no supporting evidence whatsoever for their terse statement.

22. Power production is one of the primary reasons for the construction and operation of the hydro system, and one of the authorized purposes is to provide a reliable power supply. Impacts to power must be recognized and addressed. In connection with authorizing construction of the dams, Congress established that all of BPA's costs,

including the annual required Treasury payment, are to be met via revenues gained through the sale of energy and other services provided through the operation of the FCRPS. The Treasury payment currently amounts to about a billion dollars annually. The various purposes anticipated at the time of the construction of the projects are each allocated a share of the expected benefits of the project. Power production is allocated from a low of 50% to 100% of the costs of the 14 major federal projects in the Columbia River Basin, with 13 of the 14 major federal projects allocated a 70% share or more.

23. One of the HYDSIM outputs is average power production (energy) at each dam for each month of the 50 water conditions modeled. Our modeling shows that there are very large differences between expected power production of the hydro system that would result under Plaintiffs' proposal versus the UPA/BiOp operation. These differences are displayed in 50-year average megawatts (aMW) for each month in the following chart. (For example, the aMW shown for January is the average of the 50 HYDSIM month average energy values produced in January of each of the 50 water conditions modeled.) The chart compares the amount of power that would be generated under 2004 UPA/BiOp operations (gray bar), per month, compared to the amount of power that could be generated under Plaintiffs' proposed operations (blue bar):



24. As the graph shows, the Plaintiffs' proposal significantly reduces FCRPS power production in the winter months (particularly January, 3800 aMW and February, 500 aMW), due to the reservoir levels being held as high as flood control requirements will allow, thus reducing flow through the river system. To put the reductions in perspective, it is helpful to know that it takes about 1,000 aMW to serve the needs of the City of Seattle.

25. In addition to the reduction in energy production in winter, energy reductions under Plaintiffs' proposal also occur from June through August, when the Plaintiffs' proposal limits power production to provide additional spill for juvenile fish. A significant loss also occurs in September when water drafted from storage at Grand Coulee to increase summer flows (Plaintiffs proposed 630 thousand acre-feet) is returned

to the reservoir by reducing its outflow and allowing it to refill. Some increased power production occurs in March and May.

26. The net effect to Federal Columbia River Power System (FCRPS) power generation over the 50 water conditions modeled is a reduction of about 640 average megawatts(aMW) over the January through September period (the period of the year in which the loss occurs). That amounts to more than half the energy needed to supply the city of Seattle during that period.

27. It should also be noted that the HYDSIM modeling shows the month with the largest reduced average energy production is January, the coldest month of the year when it is needed the most, and thus a time when power has very high value. The 50-year average FCRPS reduction in January is 3,800 aMW but there are a significant number (7 out of 50) of years when the January loss is over 5,000 aMW.

28. Worse yet, the loss to the region from Plaintiffs' proposal would be more than just the effect on the FCRPS because there are also non-federal dams interspersed among the federal dams that would experience similar reduced flows (and related reduced energy production) at high value times of the year. HYDSIM results show an average energy loss for the region (average of the 50 water conditions modeled for the January through September period) of about 770 aMW. That means it is expected that non-federal dam operators will lose about 130 aMW during the January through September period. Non-federal energy losses will occur primarily in the Mid-Columbia portion of the river at Wells, Rocky Reach, Rock Island, Wanapum and Priest Rapids Dams, which are owned by three Washington Public Utility Districts (PUD). Nearly all of the major public and private utilities in the northwest have purchased shares of the output of these

projects from the three PUDs, so the power production lost at those projects would be widespread. HYDSIM also models the operation of the non-federal dams. Our results indicate that the 50-year average total power reduction (at federal and non-federal dams) in the U.S. in January 2006 would amount to over 5,400 aMW. In 7 of the 50 years, it exceeds 7,000 aMW.

29. Another issue closely related to the loss of power production from the Plaintiffs' proposal is the effect on power revenues for BPA. It is the revenues produced by FCRPS power production that Congress anticipated would allow BPA to pay off the projects' cost allocation to power with its annual payment to the Treasury and also has allowed BPA to fund such activities as research and development of fish facilities to improve passage conditions at the projects. There would be a significant reduction in power revenues to BPA from the Plaintiffs' proposal. From the estimated loss of energy (reduction in generation) HYDSIM identified, BPA has analyzed the expected effect on BPA net revenues. The analysis included providing the BPA AURORA economic model with expected regional hydropower production for each month of the 50-years that were modeled for both the UPA/BiOp scenario and the Plaintiffs' proposal. (The AURORA model has been used by BPA for many years as a resource in support of our ratemaking process and has thus been closely reviewed by BPA's customers.)

30. With that information, AURORA produced an estimated market price of energy for each month from November 2005 through September 2006 under both the 2004 BiOp operation and the Plaintiffs' proposal. AURORA takes into consideration such things as the availability of thermal generating resources on the west coast, load requirements in the northwest and the price of natural gas as well as the availability of

hydropower. The estimated market prices that were the outputs of the AURORA model were then supplied as inputs to the BPA RISKMOD model.

31. RISKMOD is a monthly model that compared HYDSIM month average FCRPS energy production for each scenario (UPA/BiOp and Plaintiffs' proposal) to an estimated FCRPS load (i.e., level of consumer power demand). The purpose is to determine when BPA would need to purchase energy to meet load or, on the other hand, would have energy in excess of load to sell on the market. The Study yielded annual net revenue estimates for each of the 50-years modeled with HYDSIM for each scenario.

32. A comparison of the 50-year average annual net revenue for the UPA/BiOp operation with that of the Plaintiffs' proposal showed a loss of 347 million dollars. That is, assuming that 2006 is an "average" water year as Plaintiffs do, the economic impact to BPA would be 347 million dollars. The estimated loss for one of the 50 years modeled reached as high as 541 million dollars.

33. Further, the 50-year average value of hydro energy production lost by the region as a whole is estimated to be in the neighborhood of 450 million dollars when the prices provided by the AURORA model are applied to the energy lost to the region. The value of the portion of that energy lost to non-federal dam operators would then be about 100 million dollars.

34. These revenue losses are the result of two aspects of the Plaintiffs' proposal: (1) Net loss of energy production due to increased spill at projects (primarily June, July, and August); and (2) Loss of *value* as energy production is shifted from higher value periods to lower value periods (January-February to May-June).

Impacts of Federal Plan for Operations in 2006

35. In the Second Declaration of Colonel Greg Martin of the Army Corps of Engineers, the Corps describes the Federal plan for operation of the FCRPS hydro system for 2006. The plan modifies the Updated Proposed Action in the 2004 BiOp. The specifics of the proposal, found in that declaration, list voluntary spill criteria at the four lower Snake River and four lower Columbia River Dams as well as operating criteria for FCRPS reservoirs and project forebay levels for the benefit of ESA-listed species in addition to those conducted under the 2004 Updated Proposed Action (UPA) reviewed in the 2004 Biological Opinion (2004 BiOp).

36. In this section of my declaration, I analyze the impacts of the federal plan for 2006 operations on maintaining flows to meet the needs of other listed and unlisted species, the generation of power, and power revenues. My approach is the same as that used to analyze the impacts of plaintiffs' proposal. Specifically, I compare the impacts of the federal plan for 2006 to the unchanged Updated Proposed Action under the 2004 BiOp.

37. In my analysis of the federal plan for 2006 operations, I also use the same models and analytical tools that I use to analyze impacts of plaintiffs' proposed operations. In this declaration, I have already described these models and tools.

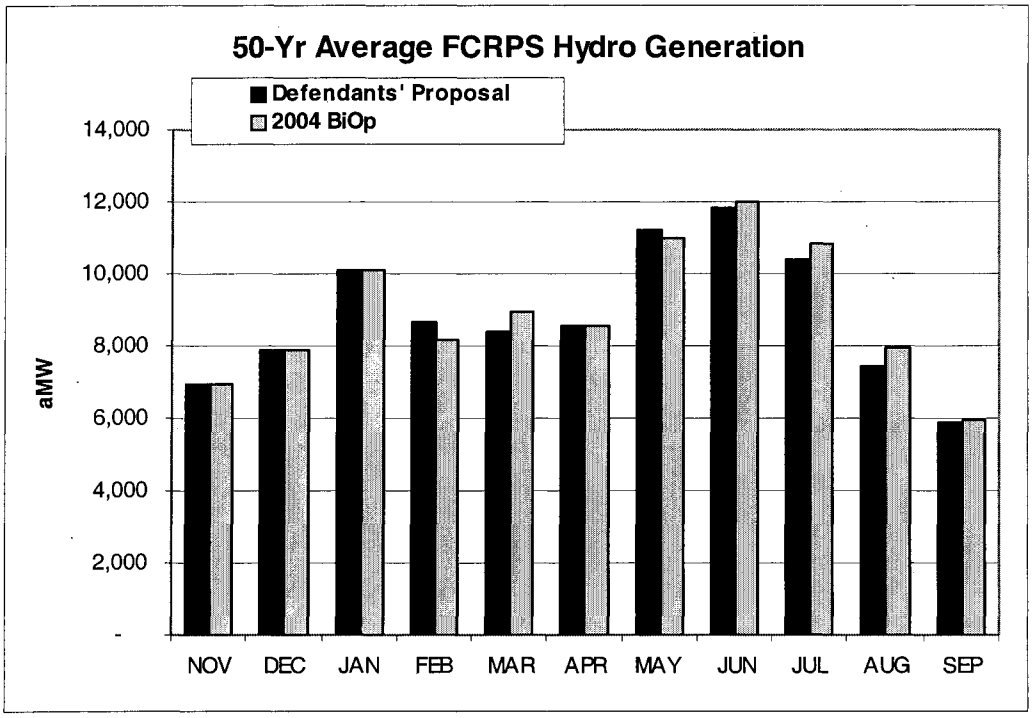
38. In the following paragraphs, I summarize the impacts of the federal plan for 2006 operations.

39. **The Federal Plan Would Not Inhibit Providing Flows For Other Species**. I used HYDSIM modeling to analyze the impacts on flows, and consequently the ability to maintain flows and river levels for various species. My analysis found no negative impacts of the proposal on the many flow-related goals that need to be addressed

by the Action Agencies in their operation of the hydro-system relative to the unchanged UPA/BiOp operation. The federal plan for operation of the federal reservoirs from November into April to accommodate the needs of other salmon that spawn in the mainstem of the Columbia River, including chum salmon and Hanford Reach fall Chinook, did not change flows relative to the UPA/BiOp operation. Other minimum flow requirements throughout the system of reservoirs and dams for other species (bull trout, white sturgeon and whitefish, for example) did not change in the federal proposal.

40. **Impacts to FCRPS Power Production.** Power production is one of the primary reasons for the construction and operation of the hydro system, and one of the authorized purposes is to provide a reliable power supply. Impacts to power must be recognized and addressed.

41. One of the HYDSIM outputs is average power production (energy) at each dam for each month of the 50 water conditions modeled. Our modeling shows that there are differences between expected power production of the hydro system that would result under the Federal proposal versus the unchanged UPA/BiOp operation. These differences are displayed in 50-year average megawatts (aMW) for each month in the following chart. (For example, the aMW shown for January is the average of the 50 HYDSIM month average energy values produced in January of each of the 50 water conditions modeled.) The chart compares the amount of power that would be generated under 2004 UPA/BiOp operations (gray bar), per month, compared to the amount of power that could be generated under the Federal proposed operations (blue bar):



42. As the graph shows, the Federal proposal significantly reduces FCRPS power production during the juvenile migration season when additional voluntary spill is provided. Voluntary spill reduces power production by taking water away from turbines and putting it over spillways instead.

43. The net effect to Federal Columbia River Power System (FCRPS) power generation over the 50 water conditions modeled is a reduction of about 125 average megawatts over the January through September period of the year when the loss occurs. Most of that loss occurs in the June through August period when the energy reduction is 300 average megawatts. The effect of operating McNary forebay at the low end of its operating range is difficult to assess with the monthly time-step model. A small amount (5%) of reduced energy production efficiency at that project is expected due to that operation.

44. **Little Power Loss to Other Utilities in the Region** - The Federal proposal results in very little net energy production loss to the rest of the region's electric utilities (a 50-year average of 3 aMW over the January through September period), according to the HYDSIM results, since the operations proposed result in only small changes in flows through the non-federal projects relative to those provided in the UPA/BiOp.

45. **BPA Power Revenue Impacts** - Another issue closely related to the loss of power production from the Federal proposal is the effect on power revenues for BPA. It is the revenues produced by FCRPS power production that Congress anticipated would allow BPA to pay off the projects' cost allocation to power with its annual payment to the Treasury and also has allowed BPA to fund such activities as research and development of fish facilities to improve passage conditions at the projects. In connection with authorizing construction of the dams, Congress established that all of BPA's costs, including the annual required Treasury payment, are to be met via revenues gained through the sale of energy and other services provided through the operation of the FCRPS. The Treasury payment currently amounts to about a billion dollars annually.

46. There would be a significant reduction in power revenues to BPA from the Federal proposal. From the estimated loss of energy (reduction in generation) HYDSIM identified, BPA has analyzed the expected effect on BPA net revenues. The analysis included providing the BPA AURORA economic model with expected regional hydropower production for each month of the 50-years that were modeled for both the UPA/BiOp scenario and the Federal proposal. (The AURORA model has been used by BPA for many years as a resource in support of our ratemaking process and has thus been

closely reviewed by BPA's customers. For further description of this model, please see the Second Declaration of Roger Schiewe.)

47. The estimated market prices that were the outputs of the AURORA model were then supplied as inputs to the BPA RISKMOD model. RISKMOD yielded annual net revenue estimates for each of the 50-years modeled with HYDSIM for each scenario. For descriptions of these models, please see the Second Declaration of Roger Schiewe.

48. A comparison of the 50-year average annual net revenue for the unchanged UPA/BiOp operation with that of the Federal plan showed a 50-year average loss of 43 million dollars for BPA. Most of this loss occurred in the June through August period as additional voluntary spill was provided at the lower Snake River and lower Columbia River projects. An additional small revenue loss for the region, amounting to about 3 million dollars (50-year average), could also be expected due to small energy production losses at non-federal hydro projects.

Conclusions

49. **Impacts of Plaintiffs' Proposal for 2006**. For the reasons detailed above, it is my conclusion that Plaintiffs incorrectly assessed impacts to other FCRPS operations, power production and BPA revenues. Plaintiffs have displayed considerable lack of concern for many other of the region's users of the hydro system in making their proposal--including other fish needs. Further, Plaintiffs' proposed operations would be extremely costly to the entire region, both in terms of reducing the amount of power produced, and in terms of shifting creation of power to lower-value periods (when demand is low). The reduced power production effects would be experienced throughout the region's utilities and even into Canada. If 2006 is an average water year as Plaintiffs

assume (without support), the costs in terms of lost annual net revenue to BPA would be about 347 million dollars. Depending on the type of water year, the BPA costs could go as high as 541 million dollars.

50. **Impacts of Federal Plan for 2006**. Compared to the unchanged Updated Proposed Action in the 2004 BiOp, the Federal plan for 2006 does not change reservoir regulation operations (outflows) much and consequently does not reduce the ability to meet minimum flow requirements for chum salmon below Bonneville, Hanford Reach fall Chinook and resident fish throughout the river system. The Federal plan for 2006 does cause significant impacts on the energy production from hydro projects on the Federal system, particularly during the period of additional voluntary spill at the lower Snake River and lower Columbia River projects. Power revenue losses for the region are estimated to be about 46 million dollars (50 year average) associated with the Federal proposal, with the large majority of those falling to BPA (43 million dollars).

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 21st day of November, 2005, in Portland, Oregon.

Roger P. Schiewe